

Identification of X-ray Beam Instability Sources for a MX Beamline at the ESRF

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Abstract

The stability of the support of optical components, in particular monochromators and mirrors, is of crucial importance for most beamlines. A number of vibration analysis techniques, including modal testing, can be used to identify structural resonances. Due to the specific beamline configuration, only some of these vibrations affect the X-ray beam stability. A study of the correlation of the X-ray intensity with vibration measurements is necessary in order to highlight the most disturbing movements of the mechanical components of the beamline.

Here, vibration and X-ray intensity measurements performed on a Macromolecular Crystallography (MX) beamline at the European Synchrotron Radiation Facility (ESRF) are presented. The effect of pumps, monochromator crystal cooling, and structural dynamic responses of relevant structures are reported. Significant improvements for the stability of this beamline were implemented as a result.

Keywords: vibration, mechanical stability, beamline, X-ray intensity

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